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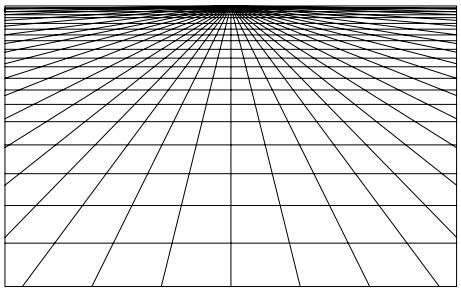

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"Project "Christmas Duck" – a contribution to local sustainability in the ecological experimental area in Halkaer Aadal?"

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Camilla Wiklund Melby

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Contents

1. Abstract

The garbage management project "Christmas Duck" which is meant realized within the ecological experimental area in Halkaer Aadal in Denmark is meant to change people's behaviour into being more sustainable in order to increase consistency between economy and ecology and to contribute to a sustainable society in Halkaer Aadal.

The project "Christmas Duck" is analysed from a theoretical point of view, being economics and behavioural theories, as there are both economic and behavioural aspects of the project.

The analysis shows that the project "Christmas Duck" can contribute in its way to local sustainability and increased consistency between the ecological and economic system of which we are part, and which determine human behaviour. Implementing the project will make it possible to gain knowledge and gather experience that can be employed elsewhere. The project can also be a dynamo for expanded sustainable behaviour.

Keywords in the thesis: sustainability, ecological experimental area (EEA), the garbage management project "Christmas Duck", the MOAB-model, neo-classic economics, evolutionary economics.

2. Introduction

Sustainability is important, as it is necessary in order to maintain life on earth. One of many factors that obstruct sustainability, but one of the most important ones, is the inconsistency between the systems of economy and ecology. The reason for this is that human behaviour has mainly been conducted by economy in the western part of the world in the latest decades, and not by ecology. It is necessary in order to get a sustainable world that both economy and ecology conduct human behaviour.

As humans we are both a part of the ecological system and the economic system. The consistency of these two systems can be increased. If it is possible to decrease the differences it can be a contribution to a sustainable world. At present we have an “unsustainable” world, if we continue like we do now we will ruin the planet Earth gradually. The environmental problem is growing.

The existing institutional and structural framework maintains the current mismatch between economy and ecology. The project "Christmas Duck" is part of an ecological experimental area (EEA) where the framework is purposely dissolved. The project can contribute to change people’s behaviour into being more sustainable and may work as a vehicle to encourage further sustainable behaviour.

The aim of an EEA is to gain knowledge and experience on how to establish a sustainable society in ecological, economic, social and cultural terms. The project "Christmas Duck" is a sub-project in the EEA in Halkaer Aadal in Denmark. Pia Johansen at Aalborg University has developed a scenario for sustainable waste management, and the prospect is as follows:

All households recycle their organic material. They give it away to a local farmer who uses this as manure for his/her fields. Each household will in return be paid with a duck for Christmas.[1]

The scenario is built upon economic calculations, and it considers three aspects of sustainability; ecologic, economic and societal. In addition it's a project involving the public from the start provided that they are willing to participate. It should be mentioned that there is a tradition in Denmark for eating duck on Christmas evening. This explains why payment is to be a duck.

The project "Christmas Duck" has both an ecological and an economic side and tries to get the two systems to unite. The project is not completely developed and therefore I may be able to contribute to the further development of the project by giving it some impulses from a theoretical point of view.

An interesting point in this context is that the two words "economy" and "ecology" origin form the same Greek word "oikos", which means to maintain a rational household in the sense to organize the life in the household so it will make a living.[2] The word "logos" means insight and understanding, while "nomos" means management and administration.[3] The two words stand for different ethical or philosophical understanding of human kind and Mother Nature. The economy places humans above the nature, while the ecology places humans as part of Mother Nature and who at the same time have insight in the superior context.[4]

[1] The Halkaer Report 2001, p78
[2] Ingemann et al 2001, p108
[3] www.solidaritet.dk/leksikon
[4] Ibid.

The example can be relevant in theoretical, political and practical terms. Theoretically it concerns people's behaviour and the consistency between economy and ecology, which will be further investigated. It can also have academic interest as the example may give feedback to the theories, concerning the relations the project illustrate and the aspects that the theories do not capture, but this will not be considered. Politically the example can perhaps raise some aspects that can be used in further policy on the area waste management. This includes both organic garbage and other waste like paper and bottles. Practically it can have some consequences for the future garbage management in Halkaer Aadal and it can be an interesting project outside of the EEA in Halkaer Aadal as waste management is tried established in many places but is sometimes unsuccessful. The project can illustrate a different way and a technology to realize similar projects in order to get a sustainable society. Though it should be mentioned that what can be sustainable in Halkaer Aadal might not be sustainable in other places as every place and situation have their characteristics. Though there are always some general factors, like people's behaviour, which make it possible to generalise and gain knowledge and experience that can be employed elsewhere.

The project "Christmas Duck" does not exist in a vacuum but in a context. It depends on and has to take its surroundings into consideration. The surroundings have impact on the project and there are aspects that are beyond the control of the actors involved. "Christmas Duck" is a sub-project of the EEA in Halkaer Aadal, which again is a part of the county Northern Jutland. The EEA is also a Local Agenda 21 (LA21) incentive.

An advantage of the project itself is that it is possible to realize, as it does not require a new technique to be developed, composting is a known technique where experiences already exist.

The project will be possible to organize. The actors who are meant to be involved have their qualities. To get the project to work out they need for instance to like the idea of getting and eating a duck for Christmas and the people do not have problems getting a living duck instead of a dead one. The people in Halkaer Aadal can take advantage of experience made from similar projects elsewhere where the same technique is used. The technique has certain aspects that are beyond the control of the actors involved, but they may be able to influence the further development, per example the organic waste bins which now come in certain shapes. Economic factors that are beyond the control of the actors are for instance the costs of the technique; what the price of garbage management costs normally; how much money the households in the area have; and the market price of a duck, like if the households prefer to buy a duck at Christmas time instead of participating in the project.

The project has to take into consideration the institutional framework within it is meant carried out. Institutions can be defined as; *"Institutions are sets of common habits, routines, established practices, rules, or laws that regulate the relations and interactions between individuals and groups."*[5] Formal institutions are laws and regulations on garbage management. The EEA in Halkaer Aadal has applied for dispensations from the law in order to accomplish the aim of the project. Informal institution is for instance people's norms and attitudes.

As mentioned there are many aspects of the project "Christmas Duck". In order to limit the thesis, and to be able to accomplish it within the time given, I choose to have a closer look at the project from a theoretical point of view using theories about behaviour and economics. It is also because I have further interests in the superior theme about consistency between

[5] Edquist and Johnson in Edquist 1997, p46

economy and ecology, and it is interesting to see if the project "Christmas Duck" is able to contribute to change its surroundings.

The consequences of the choice of using the example "Christmas Duck" as an illustration has advantages and disadvantages. The latter can be that I have to proceed according to a project that is still just a scenario, and that the project is locked up in the thought that the households are rewarded with a living duck. An advantage is that the problem chosen is reasonable to answer within the time available. An academic acknowledgement is whether one can permit oneself to generalise on basis of a single project. One can say that it is impossible to generalise from a project, but it can perhaps give some general directions for waste management. It is an advantage that the problem formulation methodologically makes it possible to employ theories on the example.

The example "Christmas Duck" may, together with other projects, in a small perspective contribute to local sustainability in Halkaer Aadal. In a broader perspective the project may contribute to a sustainable world. Similar projects can take advantage of the experience done in connection to the "Christmas Duck" project.

My problem formulation is; *"Is it possible that the project "Christmas Duck" could affect people's behaviour and contribute to an increased consistency between economy and ecology in order to establish a sustainable society in the ecological experimental area of Halkaer Aadal in Denmark?"* This gives some sub-problems; "What is a sustainable society?", "What is meant by consistency between economy and ecology?", "What is an EEA?" and "What is special about project the "Christmas Duck"?".

2.1 The thesis in a STS-perspective

The project "Christmas Duck" is originally meant as an example on how people may change behaviour helped by new technology, which again can be seen as socially constructed. It also shows that people can have influence on the technological development and push it into a sustainable path, as is the purpose in EEAs. The technological system view can be set into a SCOT perspective. SCOT stands for social construction of technology.

The STS-field, science, technology and society field, is much a response on the technological determinism of society, which says that the humans are largely determined by, rather than having influence over technology. This is opposed to the social determinism of technology. SCOT emphasizes that the division between technology and science, and technology and society, is not given, but are social and cultural constructions. As will be described later, within EEAs technology is considered to be a technique or a form of organizing, or both. Therefore the project "Christmas Duck" can be seen as a technology by using the known technique composting and a new form of organization.

Wiebe Bijker and Trevor Pinch introduced the SCOT-model in 1987, and their project was to study the social construction of technology. The concept of a ”seamless web” of science, technology and society within the model is meant to remind the researchers not to accept the distinctions between the technical and the social as these present themselves in a given situation.[6]

[6] Bijker 1995, p6

There are four basic steps in the SCOT-model:

- The first step is opening the ”black box” through a social deconstruction, in other words open for the interpretable flexibility. A ”black box” is an artifact or a fact that has already been through the process and is closed off.
- The second step is to identify the relevant social groups who manifest their interpretations.
- The third step is to identify the negotiations that lead to the interpretable flexibility progressively disappearing as they reach closure and the artifact is stabilized.
- The forth step is closure, which results in one artifact. That means one artifact attributed by one social group becomes dominant across all relevant social groups.

The process of closure is generally, but not absolutely, irreversible. It is always possible to reopen up the “black box”. Technological development can here be understood as a heterogeneous process that can take many directions as a result of interactions and negotiations between different social groups. This is the same as in the interactive development model, which is opposed to a linear and successive process among researchers.

The SCOT-model tends to imply that the character of the technological artifact is most contingent during the design process and becomes progressively less so as negotiations reach closure, until some final form of the artifact gains general acceptance or is stabilized.

The idea of EEAs is consistent with the idea of the “seamless web” in the SCOT-model. As in the SCOT-model, EEAs try to efface the diversity of science, technology and the society. The elements are meant to merge. It makes no sense to look at one element at the time; they need

to be considered together. This is one of the superior ideas of EEAs where the aim is to make the whole society sustainable, ecologically, economically and socially.

In the second step in the SCOT-model the aim is to identify the relevant social groups who manifest their interpretations. In an EEA the aim is to involve the whole society in the case to be able to change the society, but also to try out new and uncertain technologies, uncertain in both economic and functional ways. This is to make a technology accepted by social groups whose opinion might diffuse into the rest of the society. When a social group, for instance the inhabitants in Halkaer Aadal, accepts and “adopts” a technology, like the "Christmas Duck", and manifests their interpretations, the technology is one step nearer to closure.

Through negotiations the technology is settled. In the “Christmas Duck” project the actors involved have to get together and discuss the technology and how they want it to work out. Seen from a SCOT perspective, there are negotiations before closure of the technology. Negotiations are important in the EEA, as the case needs public participation and engagement to be successful. When closure is reached after negotiations, the “black box” is closed, but it is always possible to reopen the “black box” of a technology. After the parts involved in the “Christmas Duck” project have had their negotiations and reached closure for the specific technology, after trying it out for a while, it is possible to open the “black box”, go through the four steps of the SCOT-model again and reach a new closure. This process can be repeated.

The idea that technology is socially constructed is also the idea in EEA as individuals can have an influence on a certain technology from three different fields, that being an actor in the

market, of the authorities or in the civil society. In that way individuals construct the technology, being technique, organization, or both.

2.2 Methodology

I will make use of the first report from the EEA of Halkaer Aadal as basis for my project, which has a theoretical character. The idea of EEAs is rather new and there is not much written about the issue. In this matter I will make use of Jan Holm Ingemann et al's anthology from 2001 called "Samfundets Utviklingsafdeling", the societal development department. I choose to regard the reality as it is described in the Halkaer report and from the impressions I got from the one-day excursion to the area. During the excursion we attended a meeting in the project group.

The method used is a literature study and a study of a concrete example, for then to analyse the project by help of different theoretical approaches, economics and behavioural theory. The project "Christmas Duck" deals with changing people's behaviour into being more sustainable. The MOAB-model, developed by John Thoegersen from Aarhus Business School in Denmark, says that the elements motivation, opportunity and ability have to be present in order to change people's behaviour. The model can illustrate how ecology and economy can be more consistent with each other. I will therefore make use of the model to analyse if the "Christmas Duck" project can contribute in order to change people's behaviour.

Neo-classic and evolutionary economics will be used in order to see how they regard the project "Christmas Duck" and which questions they will raise. The two approaches are chosen because they are two dominant approaches within economic theory. The Neo-classic approach is chosen because it is the mainstream approach within economics and the evolutionary

approach as an alternative to the traditional neo-classic approach. The two approaches can be said to belong to two different paradigms where the evolutionary paradigm has arisen as a reaction to the conventional neo-classic paradigm. The evolutionary approach is also becoming more and more acknowledged.

Parts concerning the theme sustainability, EEAs and Halkaer Aadal are written in collaboration with two fellow students, Hilde Madsoe Jacobsen and Merethe Heyerdahl Holst, as we all write our thesis in connection to the project of the EEA in Halkaer Aadal. Later these parts have been adjusted to fit into my thesis.

3. Project "Christmas Duck" and the framework within which it is meant carried out

The project “Christmas Duck” is meant realized within an EEA, the EEA in Halkaer Aadal. The ideas of EEA are also the basis for the "Christmas Duck" project. The scenario is both meant to make the garbage management sustainable, and to contribute in the establishment of the EEA in Halkaer Aadal. This is because the nature of the project will include and engage many people in the area. First the idea of EEAs and its background will be presented to give a picture of what kind of framework the project “Christmas Duck” is meant function. Later a description of the EEA in Halkaer Aadal will be given to form a better picture of the specific area where the project is meant carried out. A presentation of the concept sustainability is given, as it is the aim of both EEAs and the project "Christmas Duck". Finally the project itself is described.

3.1 What is an Ecological Experimental Area (EEA)?

This presentation of the idea of EEAs is based on Jan Holm Ingemann et al’s anthology from 2001[7], the Halkaer report 2001 and the Kolding Manifesto[8]. There are some people at Aalborg University, Centre of Environment and Development who in collaboration with other initiators have developed the concept of EEAs. In the mid-nineties a row of conferences on technology were held in Denmark. One of these was the Kolding conference in 1997. After this a group of people came together to discuss “free areas” as a means to promote sustainable

[7] “Samfundets utviklingsafdeling – bæredyktig udvikling gennem eksperimenter”, the socital development department – sustainable development through experiments.
[8] A pamphlet published by “The network for Ecological Education and Practice – Denmark” and which also has been an inspiration to the idea of EEAs.

development through a process of trial and error. [9]. The idea originates from a discussion of technologies and their consequences.

Technology is attached to risk. No matter what kind of technology is implemented there is always a chance of some kind of failure. Technology can be divided into risky and error-friendly technologies. Risky technologies are associated with centralized and top-down management. Error-friendly technologies are small and make it is easier to relate to responsibility, quality and risk.[10] They need bottom-up management in order to give a democratic technology and to take local diversity into consideration. In that way the technology will manageable and may succeed. An example is that nuclear power is much more engraving than the use of composting. The first can be associated to so-called large and risky technologies, while the latter can be associated with small and error-friendly technologies. The "Christmas Duck" is an error-friendly technology.

The idea of EEAs is also a reaction to the last three decades' focus on the western lifestyle, of which we are part, and its influence on the natural environment. Several researches have showed that the population of western societies use more than their portion of natural resources if they were to be equally distributed. Western societies should be organized in a way that promotes sustainability and this requires fundamental institutional and structural changes. The intention of establishing an EEA is to develop knowledge and gain experience about what these changes may consist of and how they can be implemented. There have been developed solitary sustainable technologies like windmills and composting. The next step is to link these technologies together, in order to create a technology system and to provide a

[9] Members of this group was: Bodil Soegaard, Jan Holm Ingemann, Bent Hendrup Andersen, Steen Moeller, Jesper Saxgreen, Troels Dilling Hansen and Claus Heinberg. These people represent a plurality of backgrounds and educations, which will not be mentioned here, as this is not considered important in this matter.
[10] Ingemann 1999, p16

societal framework that encourages sustainable development. In a limited area the aim is to design appropriate social structures and institutions to support a sustainable society in ecological, economic, social and cultural terms. An EEA is a vehicle in this process.

The definition is not precise as EEA is a new concept. The idea consists of three elements; Ecological refers to an aim; Experiment refers to means; Area refers to a demarked area. The three words have equal weight.

- The concept **ecological** signalises both a problem and a possible solution to the present epoch where we face an ecological challenge. Humans have assumed power to interfere with fundamental natural mechanisms, which have lead to ecological problems and uneven allocation of natural resources both in time and space. In time because we are responsible of leaving our descendants resources. In space because there exists disparity in the consumption of natural resources between rich and poor countries. The notion ecological is used in its original meaning, which is the learning about nature's household. Nature's household is based on the idea of ecological circuit. The term ecological is important since the target of the idea is to create an easier interplay between various sustainable initiatives.[11]

- The concept **experimental** refers to the idea of confirming or disproving hypotheses and ideas in an experiment. Nobody can on a pure theoretical basis show valid and universal solutions on how a society can be designed to be sustainable. Valid and universal solutions have to be searched for through experiments. Knowledge and

[11] The Halkaer Report, p23

experience about an appropriate design of a societal framework can be collected in such experiments.[12]

- The concept **area** refers to the fact that experiments have to be accomplished in a demarked area. Partly because experiments including the whole nation might have unknown consequences, and partly because it would be easier within a designated area to do calculations and to be able to systematize, analyse and spread the experiences and knowledge gained from the experiment. The area needs to be exempted from certain laws to be able to carry out the experiments. This can only be done in a small area limited in space and time.[13]

The composition of the three elements into one concept holds an important point. The goal is to obtain scientific knowledge about how a society may be arranged in a way so that the technological system and the social structure in combination will support sustainable development.[14]

The aim is to create knowledge about sustainable societies for later to make it diffuse into other societies and then to the global society. In that way one starts to achieve the first ambition, then realize further ambitions before ending up in a "utopian society", which is an achievable sustainable society in ecological, economic, cultural and social terms. The first ambition can be ecological sustainability, then perhaps social sustainability, and then global sustainability, before ending up in a new "utopian society". When development towards one ambition is started, new ambitions can be introduced, one has to start on a small scale for later to expand. Adjustments have to be made continuously. The aim is to create an EEA as means

[12] Ibid., p24
[13] Ibid.

to work towards such a "utopia", and its function is to be a dynamo for the ambitions and their realization.[15] EEAs is a LA21 incentive and is in accordance with the international Agenda 21 and LA21's slogan; Think Globally, Act Locally! The superior goal of EEAs is sustainability and it is also in accordance with the Brundtland definition of sustainability, which will be explained below.

3.2 What is sustainability and sustainable development?

Sustainability is a much-used concept and has several interpretations. The concept grew out of the increasing awareness of a global ecological crisis during the last 30 years. Some of the massive problems aimed at are carbon dioxide emissions, deforestation, water pollution and large reduction in the biodiversity[16]. The concept of sustainable development is often divided into three dimensions: environmental, economic and social.

The evolutionary perspective considers it to be natural limits of the ecosystem, and the goal is a qualitative growth. This view may be called "strong" sustainability and wants the whole ecological infrastructure to be preserved. It is based on the rights of existence and development of non-human species and the whole natural system. The ecological economist Herman Daly gives this definition of the notion sustainable; *"Qualitative improvement and realization of potential may well continue forever – at least we cannot specify any obvious limits to its sustainability. Sustainable development therefore is development without growth – that is without throughput growth beyond the regeneration and absorption capacities of the environment. The path of future progress is development, not growth."*[17] The evolutionary economists are concerned with complementarities. Complementary means that the two

[14] Ibid.
[15] Ibid., "the ambition triangle" p 25 and 26
[16] Hajer, Maarten and Frank Fischer (Ed.), 1999.
[17] Daly 1996, p13

elements are needed in order to make a balanced whole, as each has qualitative the other lacks. This concerns both resources and systems; both the economic system and the ecological system have to be present.

The neo-classic perspective considers the environment as one of many goods, which together is the basis for human's welfare. Development is characterized as sustainable if the collected welfare is stable or increasing over time. An assumption for the "weak" perspective of sustainability is the possibility to substitute environmental productive assets with other kinds of assets on equal basis.

The social dimension of the concept of sustainable development does not have the similar prominent role as the economic and environmental dimensions. The social dimension can be divided into two parts. One is about the motivation force for development, like for instance consumption patterns and population development, while the other is the social effect by different environmental initiative, like changed behaviour[18]. The project "Christmas Duck" has a social sustainability aspect, as the aim is to change people's behaviour, and because the actors involved in the project have to get together to discuss the implementation of the project.

UN established a commission for environment and development in the mid-eighties, the "Brundtland commission". This commission published the report "Our Common Future" in 1987. The report concerns how the environmental resources are being exploited and it states that the road towards sustainable development is through new and environmental friendly technology. The Brundtland commission's definition of sustainable development is an

[18] www.eco-net.dk

example of a definition of sustainable development that is situated somewhere between the strong and weak definitions. It is criticized for opening up for adoption to suit a situation. Sustainable development is according to the report defined as:

"A process of change in which the exploitation of resources, the direction of investment, the orientation of technological development and institutional change… enhance both current and future potential to meet human needs and aspirations".[19]

The Brundtland commission's definition is popular. The economic dimension refers here to growth, equity, efficiency and competitiveness. The ecological refers to the ecosystems' integrity, carrying capacity, biodiversity and global issues. While the third dimension, the social, relates to empowerment, participation, social mobility, social cohesion and cultural identity. All the three dimensions are viewed important for sustainable development. The Brundtland commission's definition is based on a very comprehensive research. It points especially at the following facts:

- The use of non-renewable resources is too large. The next generation's resources for life are destroyed by the current generation.
- Pollution is threatening the current and especially the future generations' essential conditions.
- The developed countries are characterized by over-consumption, while the developing countries by hunger and poverty.

[19] www.agenda21.no/Meny/Bakgrunn.htm

Based on these facts there are four suppositions for sustainable development:

- There should be a larger production but by less resources. This supposition points at a saving of the non-renewable recourses and a more efficient use of resources. Pollution is viewed as lost resources. There has to be a change in the resource use in the western part of the world, which demands technological change. The population growth has to be reduced.
- There has to be a re-distribution from the over-consuming to the poor.
- The development must replace the growth in the material consumption with qualitative growth. The evolutionary economists wish for qualitative growth, which is in opposition to the traditional neo-classic view, which desires quantitative growth.

The United Nation's (UN) first environmental conference about sustainable development took place in 1972 in Stockholm. The meeting was concerned about environmental problems caused by the industrial countries. Later there have been several conferences, RIO in 1992, RIO+5 and the forthcoming RIO+10. The result of the meeting in 1992 was the RIO-declaration, with 27 principles, and "Agenda 21", an action program for the 21st century of how to attain sustainable development. Local Agenda 21 (LA21) is a concept within the action program and is based on chapter 28 of Agenda 21. LA21 urges local authorities to implement the idea of sustainability in each community by co-operation with the local population and by including economic and social factors together with environmental ones. LA21 is developed by means as enhancing public participation, providing public information and providing financial support to activities initiated by citizens and organizations.

EEAs are incentives in the spirit of LA21. The activity within an EEA should be built upon public involvement and the public's ideas about new strategies. The Kolding Manifesto

introduces the notion "dullards" as an expression for bottom-up responsibility and initiative. The establishment of social activities, like EEA, may create a cognitive basis on how the society can develop concerning sustainability.

The idea of EEA works best in well-functioning local societies. Local societies are usually in possession of economic and political strength.[20] Those societies are primarily characterized with openness and a common identity, which can for example be developed and maintained through cultural activities. In the countryside the local society has traditionally played a central role as a factor of solidarity. Advocates for the idea of EEAs have because of this pointed at rural societies as obvious frames for ecological local societies.[21] Ingemann says that rural areas should be seen as the key to gain sustainability in post-industrial societies.[22] In several rural areas there still exists a large extent of dynamics, which can represent a strong base of resources for EEAs.[23] Halkaer Aadal in Denmark is such an area.

3.3 The Ecological Experimental Area in Halkaer Aadal

The presentation of the EEA in Halkaer Aadal will include a geographical and demographically description, and a description of the organizational structure in order to give a picture of how the EEA is administrated.

The suggestion of implementing an EEA in Halkaer Aadal came from the geologist Claus Heinberg[24], who always looked upon this area as a geographically unique area. The river

[20] The Halkaer report 2001, p23
[21] Ibid., p27
[22] Ingemann 2001, p1
[23] The Halkaer report 2001, p29
[24] Writer of chapter 2 Ingemann et al 2001, and involved in the development of the concept.

valley is naturally demarcated geologically and topographically, as it is a watershed area, and from a geologist's point of view it would be a good place to make a project of some kind.[25]

Halkaer Tavern is situated in the river valley Halkaer Aadal. This is a place known for its good ecological food and folk music concerts. This event was started by a group of people who bought the house in 1992. The house carries a long story serving as a local merchant house with close connection to the former railway that used to go all the way out to the river valley. Today this is no longer the case, the railway was shut down and the old store was sold so the new owners have made this tavern the core of their EEA. Today Halkaer Tavern is a cooperative of 85 owners, and it is possible for anyone to buy shares at a fixed rate.

Some of the people who started the Halkaer Tavern have long been concerned about the environmental conditions around them, and when they were presented to the idea of establishing an EEA they decided to act upon it. Peter Soendergaard, who is employed as a coordinator of the project in Halkaer Aadal, contacted Jan Holm Ingemann at Aalborg University. This sparked off the establishment of the EEA in Halkaer Aadal. [26]

The serious pollution of the Northern Jutland fjord, Limfjorden, is one of the reasons for initiating an environmental project of this kind. The pollution is to a great extent caused by nitrogen (N.) and phosphor from the farming activities in the surrounding areas. This is however an issue of debate which complicates the affair of implementing the EEA. Halkaer Aadal is a watershed area, Soenderup River flows into Halkaer River and then runs all the way to the bay of Halkaer, which is a branch of the Limfjord. The amount of water led into the bay from this area is thus significant. The infusion of N. in the fjord causes destruction of

[25] Interview by Hilde Madsoe Jacobsen with Peter Soendergaard, 25.07.2001

the biological balance in and along the fjord. The fish stock is being diminished; the population of mussels has almost been extinguished. In sum the entire ecological system is affected by the pollution.

Geographical and demographical facts

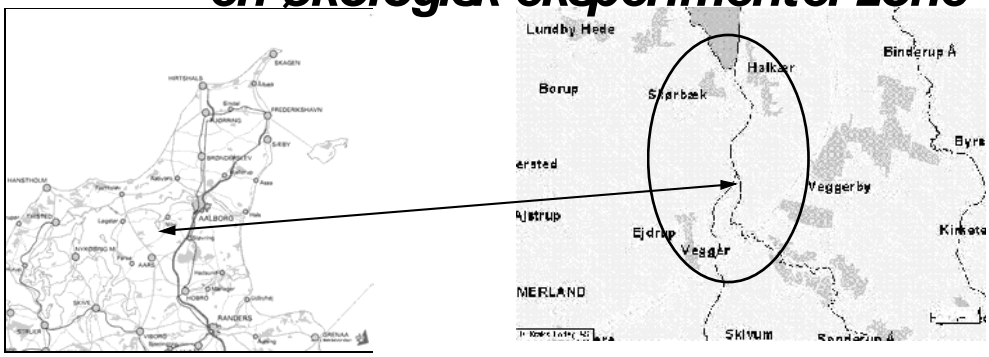
The project is situated at Northern Jutland in Denmark thirty kilometres west of the city Aalborg. A map is to find on the next page. Three municipalities surround the 19 km^2 large area; these are Nibe, Aars and Stoevring. But the definition of the area of the EEA is determined by other criteria than the formal ones, which explains why the geographical boundaries of the area are crossing the ones of the municipalities. This is due to historical, geographical and cultural facts. Culturally it is a matter of engagement in local concerns. This is expressed in quite a number of local associations, which gives a degree of common identity within this area. This common identity has historical roots due to the establishment of Skjoerbaek Ejdrup Free School[27], in the beginning of the twentieth century. There is also an extensive associative and business oriented collaboration among the four villages within this area. Geographically it has been mentioned that the area has a natural demarcation. In addition the geographical concern has also been influenced by the situation of the involved associations and people.[28]

Most of this area is covered by cultivated land. 90% is used for agricultural purposes in general, and 70% is run effectively as cultivated land. The density of domestic animal is

[26] Information collected by Hilde Madsoe Jacobsen through interview with Peter Soendergaard 25.07.2001 and talk with Jan Holm Ingemann 03.08.2001.
[27] Nicholai F.S. Grundtvig, inspired and envisaged the foundation of the Danish Folk High School and Free Schools. The idea that the commoner should have an opportunity of getting a meaningful education constitutes the ideal of the establishment of these schools in the middle of the 19th century. www.folkehojskoler.dk/old/int/side47.htm
[28] The Halkaer report 2001, p35

Halkær Ådalen

- en økologisk eksperimentel zone



Elipsen der angiver den økologiske eksperimentalzone skal ses som vejledende og ikke en statisk afgrænsning.
Området er på cirka 19 kvadratkilometer.

Forslag til indsats på boligområdet

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Folkeforeningen Halkær Ådal arbejder med bæredygtig landdistriktsudvikling i og omkring ådalen

higher than the average density in the whole country.[29] There is only a small space within this area that is not used for agricultural purposes. This is owned by the regional government, and is designated for nature- and leisure activities.[30]

The regional government possesses the planning authority.[31] This has various implications. There are rules about enterprises, containers for manure, machine stations, wind mills, antennas, distribution of land compared to amount of domestic animals, garages, shops etc.[32] These formal regulations could appear to be a barrier within an EEA because it may restrict the possibilities of experimenting with new ideas of for instance construction. Due to this it has been necessary to apply for exemption from a range of rules to be able to realize the EEA.

85% of the area has been pointed out as a *vulnerable area of agriculture*. The regional government[33] directed this in 1994 in accordance with national- and EC- ambitions of reducing the amount of nitrogen and phosphor that is being washed out in the watercourse. The amount of nitrogen and phosphor being led out from the area within this watershed is fairly high and seriously threatens the environment.[34] The arrangement consists of subsidies for those willing to subscribe to a change of management of their agricultural practice in order to reduce their use of nitrogen and phosphor. However submitting is not compulsory and thus only 150 ha. of land out of 1.248 ha. is run in agreement with this arrangement. The current agreements mostly cover small areas along the river and many of them were also earlier run in an environmental friendly way.[35]

[29] Ibid.
[30] Interview by Hilde Madsoe Jacobsen with Gustav Scaarup and Jens Ove Bisgaard 09.08.2001
[31] The Halkaer Report, p59-60
[32] www.nja.dk/teknik/plan/praksis/landzone.htm
[33] The governmental structure in Denmark is divided in to three areas of management; municipalities (local), regional government, government (central).

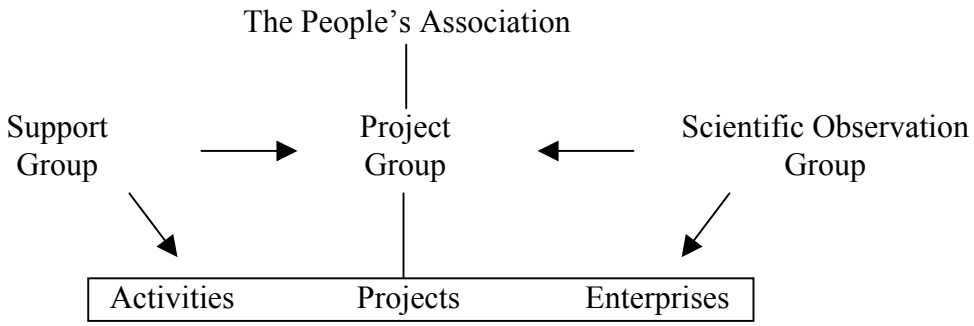
Four villages are completely or partly included in the EEA; these are Vegger, Skoerbaek, Ejdrup and Halkaer. Approximately 1000 people live in this area. In Vegger there are 350 inhabitants, Skjoerbaek holds 30-35, there are 40 in Halkaer, 35-40 in Ejdrup and the rest are living in the surrounding areas. The average age of the people living within this area seems to be lower than the average age across the country. This is due to the high rate of young families with children living in this area. However there is relatively few within the age of 18-25 compared to the rest of the country, which probably is caused by the lack of educational institutions for higher education.[36] The general income level in this area in 1998 was measured to be significantly higher than the general Northern Jutland average.

There are 25 firms within the EEA, agriculture exclusive, that together hold 112 working places. All together there are 200 people who are performing their job within this area including farming activities. This is around 40 % of the total workforce that counts 500 persons. This implies that quite a few commute to their work place. The percentage of people working as leaders and receiving high salaries is relatively higher, and there is less unemployment compared to the rest of Northern Jutland. The general level of education is lower compared to the community of Northern Jutland, however the level of income is higher.[37]

[34] The Halkaer report 2001, p60
[35] Ibid., p59-60
[36] Ibid., p41
[37] All numbers are from 1998, The Halkaer report 2001.

Organisational Structure

The EEA is being carried by an organisational structure that is illustrated beneath.



The Halkaer Aadal people's association was initiated as a point of departure for the establishment of an EEA. It was started in November 2000 as the core institution of the EEA.

The project group is at the same time the board of the public association; they play the role as an administrative unit of the project.

The support group is a group of politicians, administrators and experts who are giving feedback and inspiration to the project group.

The scientific group of observation is a group of scientists at Aalborg University observing the project. They are collecting and analysing experiences from the project, and at the same time serving as council of advice. This group also fulfils a function as a communication partner giving feedback.

The vision

The vision of the project can be expressed at two levels, micro and macro. The macro level is connected to the current environmental situation of the global society and the Brundtland

definition of sustainable development. To develop a local sustainable society is a step in the process towards achieving global sustainability. The micro level refers to the concrete project in Halkaer Aadal. The EEA is aiming at the sustainability defined in the Brundtland definition of sustainability. At the same time the issue of rural development is included, and the people working on this project are obviously more concerned about their local society than the global. The EEA is thought to be a vehicle in the process of achieving complete global sustainability, which realistically works more as moment of inspiration than the actual goal of such a project. The EEA in the same way as LA21 illustrates the need to start somewhere in the process of developing sustainability. New solutions for sustainable development in the rural areas will be tried out in the locally embedded interaction between production, authority and the civil society.[38]

3.4 Technology – technique and/or organization

"Technology and structures increase in scope and complexity beyond our control. In our wisdom we have constructed a world that we are not smart enough to manage – so we just don't."[39] This is a quotation from the Kolding Manifesto. The EEAs try to do something about what is said in the quotation, they will try to change the technology to be sustainable and to change the world so we will be able to manage it. This presentation, which shows how technology is understood in connection to the idea of EEA, is given because technology is an important factor in sustainable development and in an EEA. This shows that the project "Christmas Duck" can be regarded as a technology by using a new form of organization without using a new technique.

[38] The Halkaer report 2001, p11 and 25

Definition

Technology can be defined in many different ways, in both a narrow and a broad sense. In the narrow sense technology is defined as the technique involved. In the broad sense technology includes both technique and organization. It can be a technological change if we organize an activity in a different manner, for example a different way to collect garbage. A new technique does therefore not have to be involved in a technological change. The Halkaer report makes use of the broad definition of technology, as in how we organize ourselves, the tasks and activities we do in our life and environment.

The Kolding Manifesto has this definition of technology:

LOGOS stands for knowledge – which makes technology more than just technique. The term also denotes knowledge. Both our own and nature's wisdom. And ways of organizing a given technique. And how we and our own minds are structured by any technique. This makes technology an inclusive term for technique, knowledge and organization.[40]

All this can be summarized in three different possibilities to change the technology:

- Use new technique with the same organization.
- Use new organization with a known technique.
- Use new technique and new organization.

The project "Christmas Duck" is an example of new organization using the same or a known technique of composting. The households need to change their organization of garbage sorting and the deliverance of the garbage to the local farmer.

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[39] The Kolding Manifesto, p.13

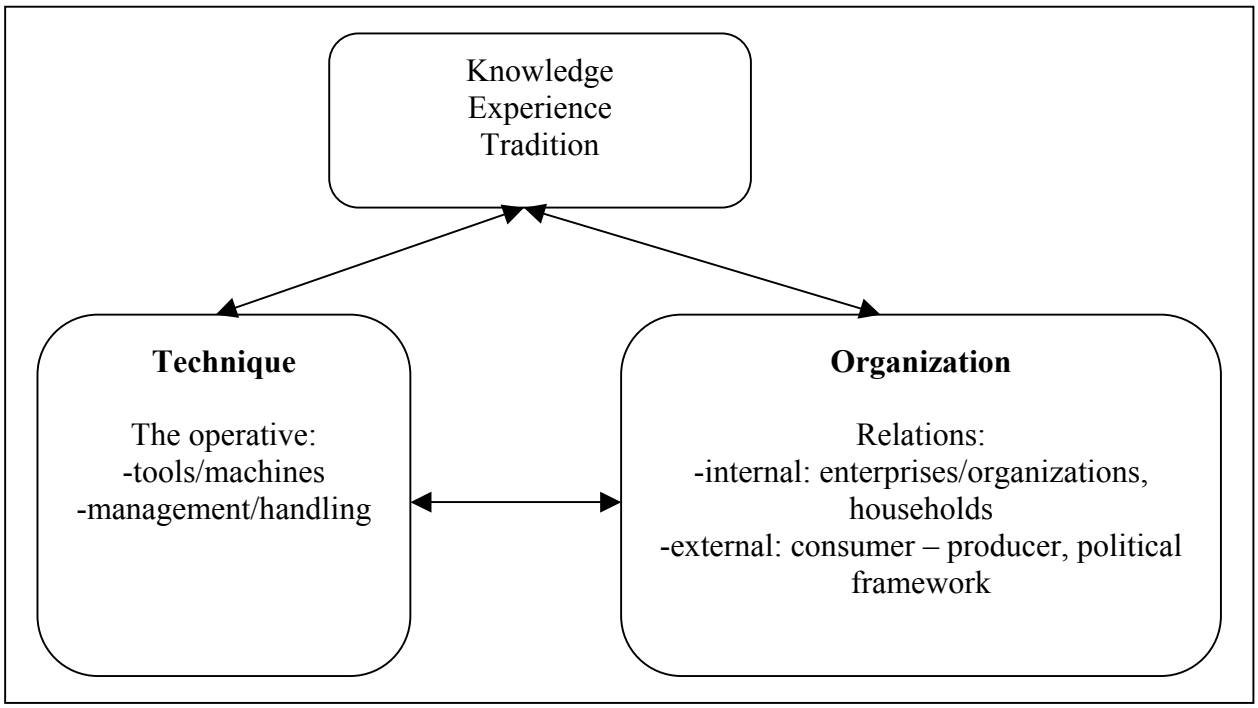
Technique deals with the tools and the machines. Technique is in that respect how to perform an action, how it is performed with the aid of tools or machines, and of the human management of those tools. An example of a technique is composting, which is used in the project "Christmas Duck". Organization deals with the relations of which the technique is a part. There are both internal and external relations. Internal relations mean relations between humans and between humans and tools in enterprises/organizations and in their homes. An example of internal relation in the project "Christmas Duck" is that the households can organize themselves to put organic garbage in a separate container in their kitchen. External relations deal with the relations between the producer and the consumer or purchaser. The political institutions regulate the external relations. The organization between the producer and the consumer can be different in each case. In the case of the "Christmas Duck" project the deliverance of the organic garbage to the farmer may be organized in many different ways. The households can deliver it themselves, the garbage may be collected by a service, or it might be a kind of depot for a number of households before the farmer gets the garbage, or even several compost depots. In the case of the specific project the consumers give something back to the producers and in that way become producers themselves. The ecological circuit is fulfilled.

There is always interaction between technique and organization, as well as interactions between those two elements and knowledge, experience and tradition. All societies have their habits on how they "do things around here" and it is common to hold on to the tradition in the area, also when there is need to search for new solutions to problems. Irrespective of how one does things or has the wish to find new solutions, it requires knowledge and experience in respect to both technique and organization. This is a reason for how a project like the

[40] Ibid., p 5

"Christmas Duck" may be tried out in the EEA in Halkaer Aadal. The area is a medium to try out new solutions to problems and to collect knowledge and experience about a matter, like garbage management.

In the Halkaer report there is an illustrating figure[41] of what is just described.



"The technology and its elements"

Jan Holm Ingemann says in the anthology from 2001 that our notions which make a synthesis between material and immaterial framework, as well as their basis for actions, based on accumulation and interpretation of experiences, make the basis for technological constructions.[42] The material framework consists of the nature given and the human made

[41] The Halkaer report 2001, p29
[42] Ingemann et al 2001, p107

ones, also to be called structural frames. The immaterial framework consists of experience, routines, ethics, belief, rights and authority.[43]

Our notions influence our actions, and when new organization is needed for a more sustainable society there are three different fields where possible actions can be performed. The three fields are the market, the authorities and the civil society, in which all humans are part of all the three fields. In the market, individuals act as producers and/or purchasers, in the authorities as voter, politician and/or manager, and in the civil society as family, association member and/or neighbour etc. Hereby is the potential of technological change in all three fields no matter which role an individual play. This can be said to be in line with the idea of the SCOT-model, social construction of technology.

3.5 Project "Christmas Duck"

I will now give a presentation of the selected project analysed in this thesis. This description of the "Christmas Duck" project is based on the report from the superior project "Ecological experimental area of Halkaer Aadal", written by Jan Holm Ingemann in April 2001 for the Halkaer Aadal people's association.

As described above, sustainable development can be encouraged by new form of organizing using the same technique, or an already existing technique. Such initiatives can be implemented immediately, as there is no need to wait for a new technology to appear. There are many easily implemented technologies that can contribute to a sustainable behaviour and world. Project "Christmas Duck" is of this kind.

[43] Ibid., p103

“Waste 21”

The project is in accordance with “Waste 21”, which is the Danish governmental waste management plan that describes the strategy and aim till year 2004. The plan points at biogas plants as first priority because it actually increases the amount of resources. A problem is that this technology requires large investments. Recycling by composting, like in the “Christmas Duck” scenario, is simpler and cheaper but demand space for storage.

The project is in accordance with the vision of the EEA in Halkaer Aadal and the scenario takes place in the existing framework of Halkaer Aadal. The project illustrates a practical, simple, but strategic move. The simple project transforms an environmental problem into a resource of nitrogen, sulphur, phosphorus and potassium. When an environmental problem is transformed into a resource, new problems arise around the democratic rules of the resource handling. This problem can be used in building up a fellowship and sense of responsibility in the local community. As a strategic move it can be a means to promote and encourage sustainable behaviour among the inhabitants in Halkaer Aadal.

The current situation in Halkaer Aadal

The current waste management in the Halkaer Aadal is organized such that the refuse disposal service collects the garbage from the households. The garbage is not being sorted, but driven to the refuse disposal plant in Aars. The households pay an amount through the property tax for renovation. In some of the councils this covers the actual expenses for the service, in other councils it does not and the municipal has to contribute.

Public engagement and consequences

The Halkaer report describes public engagement, or lack of such. In many places the authorities have organized a sorting of organic garbage. Sometimes this compost cannot be used in agriculture due to bad sorting of the waste. There may be different explanations to this matter, but one can be that the households are not aware of that it is a resource they handle, because the distance to the purchaser is too long. Another reason might be that the households to a larger extent have to relate to rules and administration than to the quite simple ecological circulation. Therefore it may be difficult to understand the consequences of one's actions, which again is supported by the fact that one is not confronted with the consequences. In the EEA the intention is to solve such problems through local, common solution models where it is difficult not to be confronted by the consequences of one's behaviour. Project "Christmas Duck" makes the households confront the consequences of their actions as the distance is decreased enormously, especially if it is the households themselves that deliver the organic garbage to the local farmer. They will see the consequences themselves, for instance if they do not sort the waste properly. The farmer will not be able to compost their garbage and use it as manure in his/her fields if the garbage is not properly sorted.

Economic calculations and incentives

The project has both an ecological side and an economic side; ecological because it will increase the recycling of garbage and; an economic side as both the households and the consumers will probably gain an economic profit by carrying out the technology. The research group from University of Aalborg has made economic calculations; a household is able to substitute 2,4 kilos of industrial produced nitrogen. This means that 100 families could support an area of about 3 hectares of land. It has been proved that this can support 120

families with 5-7 different sorts of vegetables, fruit and berries a week in plentiful amounts all year around. According to the Plantedirektoratet[44], a 100 ducks after feeding them with the same amount of wheat, barley and cloverleaf will produce 4,9 kilos more nitrogen than used in the feeding process, as the ducks also produce nitrogen. This gives even another possibility for exceedingly substitution of factory-produced fertilizer by organic fertilizer. According to the current ecological prices of nitrogen and fodder, the 100 ducks will cost the farmer 1.134 Danish crowns. He receives 244,9 kilos nitrogen with a marked value of 8-13 Danish crowns a kilo depending on its contents of phosphorus and potassium. So there are no expenses for the farmer in connection with entering into an agreement of receiving organic garbage against giving a Christmas duck to the households.

The households will have a certain requirement of decreasing the refuse service tax because they are almost halving the waste to be collected by the refuse disposal service and to garbage incineration. The part that is sorted out and given to the farmer is the most expensive part to incinerate because of the large water content. This will give the municipality a saving of 175 Danish crowns per household a year. This should give the households right to a decreased refuse service tax, but a decrease in the refuse service tax end up being a municipal decision. This can be said to be an important condition for the initiatives of the household's contributions to carry out the project.

The social sustainability aspect

The social sustainable aspect of the project is that the minimum of three groups of actors have to get together to agree on how to organize and carry out the project. The three groups are the households involved, the local farmers and a group from the public authorities. The actors

[44] The plant directorate

have to discuss among other problems how the garbage will actually be transported from the households to the local farmer and if all households are to be treated equally. Per example if a single old lady should get half a duck while a large family should get two ducks. Discussing the project will probably give the people involved a more personal "ownership" to the project, as it is their project and they want it to work out successfully.

With the suggested technology, garbage is no longer a residual product that has to be removed, but a resource that can be used in the food production. The households are transformed from purchasers of a public service into producers and suppliers of a resource to the local agriculture. As in any other context, one has to calculate with a kind of honouring for a performance if one expects continuous support and deliverance. Some people might like the idea of a dead duck better than a living duck. This matter should perhaps be discussed when the actors involved meet up. The farmer who is the purchaser of the resource is dependent on continuity in accordance with planning as well as he/she is depending on a properly sorting of the garbage. The public authorities, representing the surrounding society, will request documentation that the project is not putting the environment or humans into risk, as well as one has to expect them to request a of plan of action and handling. The three groups have to agree on several aspects so all of them will get incentives to carry out the project "Christmas Duck".

Transport of the organic garbage

An arising problem with the "Christmas Duck" project is how to organize the deliverance of the garbage from the households to the farmer. One suggestion is that the respective families take care of the transport themselves. A problem is that not every family has a car or is able themselves to do the deliverance. A centralized composting system via the renovation

companies require significant resources for transport and handling of the organic garbage in addition to resources for storage of the compost. The garbage service company might be a likely actor to do the transport, but this requires a significant amount of resources for transport and the handling of the organic garbage together with resources for the storage of the compost. One of the aims of the project is though that the households shall deliver the garbage to the farmer themselves in order to see the consequences of their actions.

Dispensations from the law

It will take the farmer a certain amount of time to do the composting, but then he/she does not have to pay for fabricated fertilizer. There are several requirements in the law on how the compost is to be treated, and analyses have to be made when the garbage is delivered directly to the farmer, but it can be expected that the Halkaer Aadal area, which include 2-300 households, will get dispensation from the requirements about analyses to be done.[45] A natural question to rise in this context is; why should an EEA get dispensations from the law? Why should an area that is supposedly trying to be more sustainable than other areas have fewer restrictions than "normal" areas? The existing institutions and structures constitute lack of sustainability. Getting dispensations from the law is though necessary in order to accomplish the social experiment. Later one can do sustainable assessments on the activity within the EEAs. There are some restrictions though; the farmer has to calculate the compost in the fertilizer accounts and the Plant directorate may require analysis of the nourishment contents when it concerns more than 10 tons of dry substance.

[45] Inge Vibeke Hansen in the Miljoebestyrelsen (the administration of environment) has said this.

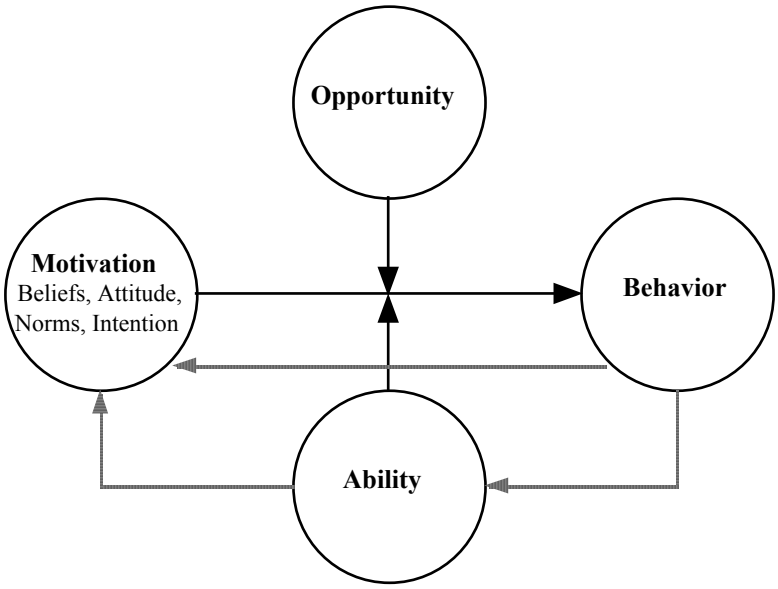
Uncertainties

There are lots of uncertainties in and around the “Christmas Duck” project. Aspects like for instance how to transport the garbage to the farmer should maybe have been described in the scenario, but on the other hand this are decisions that have been left out so the people involved will have to get together to discuss the project. This is seen from the social sustainable point of view. There has not been made a life cycle model for the project. A life cycle model explains how it will start up, run and end.

4. Changing people's behaviour into being more sustainable

One of the aims of project "Christmas Duck" is to help in the process of changing the consumer's behaviour to be more sustainable. In order to find out more about this I will make use of the MOAB-model where the letters stand for motivation, opportunity, ability and behaviour.

John Thoegersen has developed a model on the basis the Agenda 21 program and of the following question; how to change people's behaviour to be more ecological? Thoegersen finds that all elements in the model have to be present if behaviour is to be changed. The model is as follows:



The motivation - ability - opportunity - behaviour model[46]

[46] Thoegersen 1998, p36, the dotted arrows in the model is due to John Thoegersen's focus and represent feedback. This distinction will not be made in this thesis.

Motivation

The motivation in the model can be that one wants to contribute to save the world, one might be ill because of unsustainable behaviour or one might find out that there is money to save for instance by using less electricity. Motivation includes a person's belief, attitude, norms and intentions. The motivation can be based on political, economic or personal reasons. As with all other choices in a competitive market, motivation is a necessary condition for environmentally friendlier consumer choices.[47]

The motivation might be killed if an enthusiastic consumer experience that it is not worth the effort. This can be caused by lack of opportunity and knowledge, besides distrust in own ability to influence society's environmental problem.[48]

Opportunity

To change the behaviour one also need to have the opportunity to do so. It is difficult if not the right infrastructure or the institutions are present. If motivated consumers for some reason are not able to buy organic products, for instance if ecological foods are not available in the supermarket or there is no opportunity to recycle organic garbage, their good intentions are of little use.[49]

Ability

People also need to have the ability to change to a sustainable behaviour. The ability can be economic ability to afford buying ecological products that cost a bit more than conventional products. Ability also includes holding knowledge about sustainable behaviour. This can include knowledge about for instance waste sorting; knowing what to put in which bin. Safety

[47] Thoegersen 1998, p37
[48] Ibid., p92

and regulations and what constitutes an environmentally friendly product are also necessary to have knowledge about. There exists uncertainty about this both on the producer and the consumer side. Consumers need specific and reliable information in order to be able to choose the most environmentally friendly alternative when competing options are offered or to do the right thing when asked to change a behavioural routine.[50]

Behaviour

Consumers are called upon not only to change buying, use, and disposal habits but also in their capacity as voters to actively support changes in the emphasis of national policies from quantitative growth to qualitative development.[51] This can be seen in coherence with the earlier explanation of the technological view in EEAs where it is shown how a person can have impact on the society and the technological development by different roles they play. This can be transferred to this context about consumer behaviour.

All elements have to be present to change the behaviour into a sustainable trajectory. MOAB is a dynamic model; it is interplay between the elements. One can say that the project "Christmas Duck" can make the household save some money. This can make them more motivated to further changing their behaviour and also give them the opportunity to buy ecological products because they now can afford since they save money from participating in the project. This can again give motivation to expand the sustainable behaviour. This illustrates that the project “Christmas Duck” might be a vehicle in the process of changing people’s behaviour into being more sustainable.

[49] Ibid., p37
[50] Ibid., p53
[51] Ibid, p8

Convenience

Research done by Thoegersen shows that even when consumers are highly motivated to act in an environmentally responsible way, if the channels for recyclables do not provide at least the same degree of convenience as the one for other waste, a large amount of recyclable is likely to end up in the "other waste" channel. Because consumers may be largely unaware, or may deny, that they dump recyclable waste under less facilitating conditions, it is particularly difficult to control for this effect.[52] Recycling might therefore not be enough to change the behaviour into the wanted pattern. The actors involved in the "Christmas Duck" project have to take this into consideration when they get together to discuss how to carry out the project. It needs to be convenient so the participants will continue to support the project.

Spillover effects

It can be said that there are both positive and negative "spillover" effects from recycling.[53] A positive spillover is that it promotes further sustainable behaviour. A negative effect can be that individuals who are carefully sorting their garbage think that they already contribute with their share to solve the waste problems so they do not have to be prudent for instance when they go to the supermarket.[54] The effects are hard to predict, but as the project "Christmas Duck" is part of a larger project, it might give information through different mediums and make people aware of the ecological problem. This may lead to further engagement to solve the problem.

[52] Ibid., p59
[53] Ibid., p34
[54] Ibid., p95

Economic incentives

Thoegersen says that economic incentives can make people act in an environmentally friendly way if the incentive is large enough.[55] Experimental studies indicate that for an economic incentive to influence behaviour, a precondition is that it makes considerable economic difference for the consumer.[56] It depends though if the "Christmas Duck" project is able to do this. There are economic incentives in the project, a question is if they are large enough to encourage the inhabitants in Halkaer Aadal into changing their routines, norms and therefore behaviour. The project might appeal to people's morality. Thoegersen also says that it may be concluded that economic incentives can promote behaviour either by increasing the motivation to perform the behaviour or by reducing a barrier that restricts the translation of motivation into appropriate behaviour.[57] This can only be seen after considering the public participation in the project as the project is still on the sketch board.

[55] Ibid., p61
[56] Ibid., p61
[57] Ibid., p63

5. Economic analysis of the project "Christmas Duck"

This chapter consists of an economic analysis, as there is an economic side to the "Christmas Duck" project. I will analyse how the economic approaches will consider the project and see which questions they will raise in coherence to the project. The MOAB-model and economics concern many of the same topics. For instance economic incentives and utility in economics can be regarded as motivation in the MOAB-model.

Herman E. Daly sketches the difference between neo-classical and evolutionary economics. He says that **neo-classical** economists regard everything as economics. Everything can be given a value and be "ranked" in proportion to each other. Natural productive assets can be substituted by capital, as there are no limits to natural resources. Daly calls it "economic imperialism", in which the subsystem, the economy, becomes identical to the total system, everything is economy and everything has a price. Internalisation of externalities has been carried to the limit and nothing remains external to the economy.[58]

Evolutionary economics regards everything as an ecosystem. The choices and actions humans take are all based on the same conditions as in an ecosystem. Variation and selection are central concepts in evolutionary economics. Daly sees it as *"to shrink the economy boundary to nothing so that everything is an ecosystem."*[59] He calls it ecological reductionism. Economies, like ecosystems, are governed by the dictates of survival. This goes back to Darwinism and survival of the fittest. There is no marked boundary between evolutionary and ecological economics. Therefore I will complement with some ideas from ecological economics in the analysis on the basis of evolutionary economics. **Ecological**

[58] Daly 1996, p11

economics, to which Daly associates himself, consider the economy to be a sub-system of the eco-system. The eco-system is limited and therefore limits the economy as well. As Daly puts it: *"Once you have drawn the boundary of the environment around the economy, you have said that the economy cannot expand forever."*[60] Humans are seen as part of the nature, not separated, which is the case in neo-classical economics. Explaining the difference between evolutionary and ecological economics, two rather similar approaches, is that evolutionary economists are mainly explanatory, and ecological economists are more normative. The evolutionary economists, the institutionalists, try to explain why there is a contrast between ecology and economy. The ecological economists try to indicate what is needed to abolish the contrast between ecology and economy.[61]

Two paradigms

It can be said that neo-classic economics and evolutionary economics belong to two different paradigms. The concept originates from Thomas Kuhn. A paradigm brings about a unity of which theoretical assumptions are valid, what kind of problems are worth to be occupied with and which methods to use.[62] That neo-classic and evolutionary economics belong to two different paradigms can be related to the change in the mass belief system, from an industrial/materialistic way of thinking to a post-industrial/materialistic way of thinking. Neo-classic economics can be associated with the industrial paradigm, and the evolutionary approach can be associated with the post-industrial paradigm. The industrial society is concerned with materialistic values and gives high priority to economic growth.[63] It now looks like our society changes values and that we find ourselves moving towards a post-industrial trajectory or path. The post-industrial society implicates increasing focus on

[59] Ibid., p11
[60] Ibid., p7
[61] Ingemann, e-mail 7th of July 2001
[62] Johannessen 1985, p138
[63] Ingemann & Abrahamsen 2000, p23.

elements like environment, health and quality of life.[64] There is also a movement in the understanding of rationality, from economic rationality to ecological rationality. Rationality describes to which actions are attached great importance and which actions are regarded as a decisive standard for suitability. The industrial stereotype employ an economic scale, while the post-industrial type employ an ecological scale, that is to estimate an action on basis of its ecological consequences.[65] The latter can be associated with a sustainable mentality.

5.1 Neo-classic economics and its view on ecology and the project "Christmas Duck"

Neo-classic economics originate from the end of the 18th century and the beginning of the 20th century. The approach is concerned with allocation of scarce resources and about a long-term equilibrium. Everything is given a value or a price, which makes it possible to do a ranking or comparison to other objects or values. Humans are regarded as separate from Mother Nature, which is seen as a source of an unlimited amount of natural resources, both renewable and non-renewable, and able to handle all our waste. Neo-classical economists probably agree on that we need sustainable development, but it is not a theme in their theoretical framework. In this analysis I will make use of, and make the analysis on conditions of, simple textbook neo-classic models with several assumptions. The advanced neo-classic models permit much more than the simple models, however, for this analysis the more simplistic versions will do.

[64] Ibid.
[65] Ingemann 1999, p30.

The simple neo-classic models construct a model of utopia: a society in which individuals could behave according to their assumed nature; a society based on self-interest.[66] The real imperfect world is meant to be more like the ideal perfect society. The theory assumes a perfect competitive market economy that satisfies the equilibrium conditions for Pareto optimality.[67] The Pareto optimality, or Pareto efficient allocation, condition is described as a situation where each individual is in equilibrium with every other individual: so no one can become better off without someone else becoming worse off.[68] The neo-classic utopia assumes perfect competition, which conditions are commodities in the same market are always bought and sold at the same price, there are no economies of scale, all actors hold perfect information and everybody has the freedom to enter a market.[69] Perfect information is all information about a situation or a matter they have to make up their mind about, and that they make use of it. These are unrealistic assumptions. In the simple neo-classic model the project "Christmas Duck" will be defeated, as it does not satisfy any of the conditions given. But parts of the theory can be abstracted and employed on the example like the concepts of utility, economic incentives and the Edgeworth exchange box.[70]

The Edgeworth exchange box

The Edgeworth exchange box assumes perfect competition and that price of the goods are set, which makes it possible for pure exchange. The box can be used to analyse the exchange of two goods between two people. In the example "Christmas Duck" one can consider the two goods as organic garbage and ducks. The local farmers in the Halkaer Aadal can be

[66] Cole 1999, p35
[67] Ibid., p41
[68] Ibid., p40
[69] Ibid., p41
[70] The Edgeworth box is named in honour of Francis Ysidro Edgeworth (1845-1926), an English economist who was one of the first to use this analytic tool. (Varian 1999, p508)

aggregated into one representative actor for all farmers in the area, and the same for the households. This gives two representative actors, the farmer and the household.

The initial endowment allocation can be described as the household having organic garbage and the farmer having ducks. From the calculations made in the scenario it is possible to assume that the price for the amount of organic garbage and ducks are set, as in for getting a duck, how much organic garbage does the farmer require. When the exchange has found place, one ends up at a final allocation. The "Christmas Duck" project can on this basis be regarded as an exchange market.

Perfect information

In the situation of an EEA or the project "Christmas Duck" the information is not perfect, there are many uncertain aspects as for instance how the garbage will be transported from the households to the local farmer. Another uncertain aspect is if the project "Christmas Duck" is worth the effort.

Utility

Neo-classical theory is concerned with "utility". This goes back to the Victorian days and Hal R. Varian describes it like this: *" "Utility" was considered as an indicator of a person's overall well-being. Utility was thought of as a numeric measure of a person's happiness. Given this idea, it was natural to think of consumers making choices so as to maximize their utility, that is, to make themselves as happy as possible."*[71] The approach has later reformed this to be a theory of consumer behaviour in terms of consumer preferences. Varian sees it as; *"Utility is seen only as a way to describe preferences."*[72] Individuals maximize in every

[71] Varian 1999, p54
[72] Ibid.

situation to be as happy as possible. The actors are said to be rational when they maximize in their own interest. Depending on the value given by the actors on the technology "Christmas Duck", the technology will be a success or not, as this will indicate their will to participate. If the individuals give this technology a high value because of high preference, maybe because it also appeals to their morality, it will be successful. If this is not the case and the individuals find the technology low value and to be requiring too much of an effort, the technology or project may fail.

The advocates of the projects have to take into consideration which utility value the actors involved put on the project, both on the superior idea of EEA and the project "Christmas Duck". If the actors reckon that this is a good project they will put a high value on the project and maybe see it as a good solution to the waste problem, which at present is not sustainable. Giving the project a high value, it will be carried out and probably have a better possibility to be a success.

Economic incentives

A question to rise in this case is if the right economic incentives are given to make the project "Christmas Duck" a success. The neo-classic approach is concerned with the economic incentives as basis for actions, but also which conditions the incentives are based on, which are the preferences of the consumers and economic rationality. In the case of the "Christmas Duck" project the economic incentives for the households are that they get a duck, still alive, at Christmas time and that they probably get a decreased refuse service tax by 175 Danish crowns. The economic incentives for the local farmer is that he can substitute factory-produced fertilizer, which he/she has to pay for, by organic fertilizer that he/she gets in return for buying and feeding ducks for a year. The Halkaer report says that, "other things being

equal" participating in the project will not give the farmer any extra cost. The ducks also produce nitrogen that the farmer can use in the fields. Both the households and the farmer are meant to earn on the project "Christmas Duck". The local garbage service management will get less garbage to collect, but is left with the most difficult waste to break down. The company will probably have to discharge some employees. This can apply to the neo-classic economists as an incentive to support the project. The garbage service company might save some money on discharging some employees. This can be sustainable if the resources can be used efficient elsewhere.

A dead duck can be more attractive for some households than a duck they have to kill and strip. It might be possible for an agreement with the farmer, but that will either cost the farmer time or the households have to pay for it. This will probably give either the farmer or the household less economic incentive to participate in the project.

Micro and macro level

The neo-classic economists are concerned with direct and indirect economic effects, which can also be seen as the interplay between micro and macro level of the economy. The project "Christmas Duck" will have direct impact on the consumer and the local farmer. The micro level is concerned with the economic incentives of the local farmer and the households involved. The indirect economic consequences or effect on a higher level, the macro level, can be that the local government has to discharge someone. The local authorities may have to do some redeployment of their employees.

Technology

The neo-classic approach supports a linear innovation model. In the first place, the approach does not consider technological change. It is regarded to be a source for economic growth, but technology comes as "manna from heaven". In the simple textbook models technology is considered to be exogenous. The technology available to firms is unaffected by the actions of the firm, including research and development.[73] The linear innovation model does not open up for changes after a technology is innovated, no feedback is possible like it is in the interactive innovation model on which evolutionary economics rely. The idea of EEA, and its aim of ecology, is based on an interactive process where the new technologies, or existing technologies, are put together into the same technology system and tried out. Feedback and changes made on the basis of the feedback from the actors involved are essential to carry out the idea and gain knowledge and experience.

Substitution

The neo-classic economists will probably consider the goal of the EEAs and the "Christmas Duck" project, ecology, to be a good idea, but they are not concerned with the topic in their theoretical framework. Mother Nature is seen as a source of an unlimited amount of resources. The resources can be substituted with labour force. Labour force and resources are treated as equal substitutes and there is no problem in replacing scarce resources with labour force. This is not consistent with the aim of the cases described as the basic idea here is to limit the use of scarce resources and try to recycle them so they can be reused. In an EEA they have a different opinion of the substitution of resources and labour. Labour and resources are considered to be complementarities; both elements are seen as necessary in order to make the society function.

[73] Jones 1998, p19

This analysis has shown that neo-classic theory is not able to explain most of the aspects of the "Christmas Duck". The analysis and presentation of the neo-classic approach can give a picture of what the evolutionary approach to economics is a reaction to.

Questions that will be raised by the neo-classic approach

The simple neo-classic models focus on utility, economic incentives and regard the "Christmas Duck" as an exchange economy. The approach is static and the aim is an equilibrium state. Economic calculations made in the scenario "Christmas Duck", and the economic incentives given, show that from a static point of view, "other things being equal", the project is worth while and contribute to sustainable society in Halkaer Aadal. The neo-classic approach will in accordance to the project raise the question if the right economic incentives are given. Also which utility value the actors involved put on the project and what are the direct and indirect effects of a project like "Christmas Duck"? Is the project worth the effort on basis of the conditions given when there are imperfect information and so many uncertainties?

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5.2 Evolutionary economics and its view on ecology and the project "Christmas Duck"

Evolutionary economics is an alternative to the mainstream neo-classic approach. Evolutionary economics basically transfer the ideas of biology into economics and make use of the ideas of variation and selection. This will be explained below. Evolutionary economics has most in common with the classical economists from the 19th century like Ricardo, Adam Smith and Karl Marx. They regard the economy in a long-term perspective and focus on

technological change and innovation as reasons for economic growth. The evolutionary approach to economy started in the beginning of the 20th century with personalities like Thorstein Veblen and Schumpeter. During the last decade there has been more focus on and development within the approach.

Evolutionary economists consider the actors to have bounded rationality as rationality is based on experience and the information available might be uncertain, or to say it in another way, the actors act rational on limited information. In other words, individuals operate under the constraints of localised, imperfect and uncertain information.[74] They act in a way that they believe will be to the better but not necessarily in their own interest.

Within evolutionary economics nothing is stable, everything is in continuous alteration to a large extent due to technological change. In the conventional approach a stable situation is the goal. Evolutionary economics is of a dynamic character and sees matters to change over time. The market selects the best actors with the best routines to survive in the economy. This goes back to Darwinism where the strongest, or the one with the best adaptability survives. An important feature is that neo-classic economists consider technological and institutional change to be exogenous, variables determined by factors outside of the economy, while the evolutionary economists consider the changes to be endogenous, determined within the economy.

Evolutionary economists want qualitative instead of quantitative development, development for better exploitation of natural resources, which is to get more out of less. Neo-classical economists count on an unlimited amount of natural resources, while the evolutionary

[74] Metcalfe 1994, p933

economists are of the understanding that these resources are limited. The idea of EEAs and the "Christmas Duck" project is in line with the ecological economics idea of qualitative development instead of quantitative development. Both try to realize exactly that by trying to get more out of the non-renewable natural resources. The "Christmas Duck" project will recycle waste and generate new resources that a local farmer can use as manure in his or her fields.

Ulrich Witt in Hodgson 1991 has defined evolution: *"Evolution is considered to be the transformation of a system over time through endogenously generated change."*

The evolutionary approach to economics raises certain key question and is concerned with certain concepts and mechanisms. Central are variation, mutation, selection and trajectories. It goes back to Veblen's writings that say science and technology are regarded as one of the major motors of economic and social advance.[75] Evolutionary economists want to move economics towards the real world, something they criticize the neo-classic economists for doing opposite. The title of Hodgson's book from 1993 describes the issue; "Economics and Evolution, bringing life back into economics". Evolutionary economists want to treat the world like it is and not like an aggregated world with representative actors, they want to treat humans as individuals and situations as unique. Evolutionary economists also ask why is it that one technology survives over another.

Mother Nature and humans

Evolutionary economists probably like the idea of the "Christmas Duck" project as it tries to make the individuals feel like they are part of Mother Nature as the intention is to get the

[75] Hodgson 1993, p136

humans and the nature to converge. The project makes the individuals involved see the consequences of their actions. It is no alienation between humans and the nature, rather the opposite.

Ecological economists consider the economy as a sub-system of the total eco-system. Mother Nature is considered to both hold resources and to be a sink basket that has to tolerate the waste refuse. The "Christmas Duck" project will help the sink basket get an easier job, which is necessary if we want the planet Earth to survive.

Variation and selection

Metcalfe sees variation and selection as; *"the processes which determine the range of actual innovations – variety – introduced into the economy; and, the processes which alter the relative economic importance of the competing alternatives – selection."*[76] The relation between variety and selection is two-way; variety drives selection while feedback processes mean that the process of selection shapes the development of variety.[77] Variation is caused by mutation. Mutations are technological changes and innovations. The innovations can be radical or incremental. Radical innovations are completely new technologies; incremental innovations are adjustments of already existing technologies. Mutation can include both planned reorganization of, and unintended changes within, institutions. An example can be when a firm's profit levels become intolerably low it is forced to search for a new technology.[78] R&D institutions like universities can also play a role in creating variety.

Market forces is said to function as the selection process. This can also be seen as the selection process going on as bad routines disappear and new routines associated with higher

[76] Metcalfe 1994, p933
[77] Ibid., p933, Hodgson 1993.

profit levels are adopted.[79] The market competition forces this to take place. Metcalfe concludes in his article; *"Economic variety drives economic selection and economic selection drives variety, to define the process which is the proper domain of technology policy".*[80] It is therefore a dynamic process where each element relies on the other. The interplay between variation and selection promotes evolution.

The "Christmas Duck" can be seen as a variation to the existing garbage collecting system shaped by the demand of a sustainable lifestyle. The existing system is the project's only "competitor" between which the market has to select among. Seen from the concept of selection, the project might be rejected by the market, which might find the present system better than the scenario "Christmas Duck". The context can perhaps be better off with more "variations" of the garbage system. Maybe the idea where the households compost themselves could be a "better" competitor to the present system than the "Christmas Duck" project.

The project "Christmas Duck" may help to "guide" the innovations towards a sustainable development trajectory or path, but it may end up being selected away or refused by the market. The variety and selection process cannot be regarded separately; therefore the process of innovation and diffusion cannot do it either. This gives associations to the interactive innovation model again. It also gives opportunities of joint market innovation and technology evolution. The project "Christmas Duck" can perhaps be able to influence the market as it makes use of a known technique but a new form of organizing, which is defined to be a technological change in the case of EEA and the project "Christmas Duck".

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[78] Hodgson 1993, p47
[79] Ibid., p44
[80] Metcalfe 1994, p941

There needs to be a variation so the inhabitants in an EEA, or the indented participants of the "Christmas Duck" project, have several varieties to select among. The inhabitants might feel that they are not doing the selection process but are "forced on" the project. A broader variety of alternatives to garbage management may give the inhabitants in Halkaer Aadal the ability to make a decision – participate in the selection process – to make the project a success. The scenario requires though that the actors involved get together to discuss how they will carry out the project. It is because of this, which opens up for social sustainable aspect of the project, that the research group from Aalborg University does not describe everything in the scenario.

Novelty

Looking more closely into how novelty is generated, two features of behaviour show up: the motivation behind the search for novelty and the cognitive problem of the mental creation of novelty. The first feature can be characterized by asking why people search for novelty – something the meaning of which that cannot be foreseen, and therefore evaluated, during the search.[81] The mental creation of novelty needs capacity to escape from any local constraints. This is simply another way of saying that change in endogenously generated.[82] This is incongruent with the "Christmas Duck" project, which is an idea of researchers from a university, so it is more or less an exogenous idea, but the scenario is also a result of participation in building up the EEA in Halkaer Aadal. The Halkaer Aadal area though is part of a bigger system. This can be regarded as a larger innovation system of which Halkaer Aadal is a small part. The inhabitants in the small area cannot innovate everything on their own; they are able to and willing to take advantage of innovations from outside of the area. Innovations are never developed in isolation, but in a context within an innovation system.

[81] Witt in Hodgson 1991, p88
[82] Ibid., p90

Technology is innovated within the system and is therefore an endogen variable according to evolutionary economics. The innovations done in the EEA will hopefully diffuse into the rest of the society.

Development

The common foundation of an evolutionary development understanding is based on that the development of the human society is determined by interplay between given conditions on one side, and the choice between possible resolutions and actions on the other side. This implies that the conditions given, even in certain natural settings, can be deliberately changed.[83] Development is in the evolutionary approach seen as a process. Innovation and diffusion of a technology cannot be separated. Feedback from diffusion is being one of the critical elements in shaping how a technology is developed.[84] This can also be called an interactive innovation model. Some innovations might not be so open to this process because they have fallen into trajectories, a kind of lock-in effect. A trajectory is a path or course the technology follows. The trajectory can be socially constructed or following a certain way of thinking. The "Christmas Duck" project tries to change people's behaviour into a sustainable trajectory, as described earlier in the chapter about the MOAB-model.

Neo-classical economics has a technological deterministic view, which means that the technology determines the society. Evolutionary economics consider it to be opposite; the technology is socially determined. This point of view is shared with the social constructivism, which says that technological innovations are socially determined or constructed. The evolutionary economists Farmer and Matthews in Hodgson 1991 see social construction of technology (SCOT) as a compatible approach with the treatment of actors as rational. They

[83] Ingemann et al 2001, p16.
[84] Metcalfe 1994, p931

reckon that actors are rational when acting in the way they believe or hope will bring a better condition, rather than making an objective correct action. Farmer and Matthews says: "*If one interprets "acting rationally" in a subjectivist rather than objectivist way, it is possible to leave open a role for the social shaping of individuals and their cognitive world, and therefore, of course, of the technologies they develop."*[85]

From an evolutionary economist point of view the technology "Christmas Duck" is an uncertain technology, and bringing in the SCOT-model, the technology is far from the point of closure. The idea might though create its own market like Edison once did with his electricity supply system. Edison created a market for his invention. The "Christmas Duck" technology may try to compose a co-development of market and technology. The demand can be said to be the requirement of a sustainable society. The "Christmas Duck" project can influence the market for its own advantage, as the evolutionary economist J. S. Metcalfe says: "*The significance of this* (the analysis of innovation and diffusion together in the evolutionary competitive process) *for the conduct of technology policy is to see opportunities to innovate as the joint products of market and technology evolution."*[86] The institutions producing knowledge like the Aalborg University in this example are important in this situation.

No "optimal" solution

The evolutionary economic approach has no measure of what is optimal, but it is always possible to make a situation better. When not having a measure for what is to be optimal and not having a recipe on how to make a situation better because every situation is considered to be unique and need special adaptation, a comparison of the different situations is the only

[85] Farmer and Matthews in Hodgson 1991, p113
[86] Metcalfe 1994, p939

option to see what can be a success or not. In the situation of the “Christmas Duck” project there are no existing similar situation. One can only compare it to the present situation.

Which questions are raised to the approach to project "Christmas Duck" by the evolutionary approach?

The evolutionary economists regard the world as dynamic, opposite from the neo-classic economists. The analysis has shown that this approach is closer to the real world than neo-classic theory. Important concepts within the evolutionary approach are variation, mutation, selection and trajectories. The approach would probably raise some of the following questions concerning the "Christmas Duck" project; is there enough variations in order to accomplish a selection process? Why will the "Christmas Duck" technology survives over another waste management technology? Is there a development process, including feedback, going on in the development of the "Christmas Duck" technology in order to change people’s behaviour into a sustainable trajectory?

6. Conclusion

The problem examined in this thesis has been; *"Is it possible that the project "Christmas Duck" could affect people's behaviour and contribute to an increased consistency between economy and ecology in order to establish a sustainable society in the ecological experimental area of Halkaer Aadal in Denmark?"* This has given the following sub-problems; "What is a sustainable society?", "What is meant by consistency between economy and ecology?", "What is an EEA?" and "What is special about the "Christmas Duck" project?".

The idea of sustainability is that we are to leave our descendants resources so they will be able to maintain life on earth. If we want to do that the formal and informal institutions have to change. People need both will and opportunity to change their behaviour. The current institutional framework makes that difficult. It also supports the inconsistence between the systems of ecology and economy, which determines our behaviour. Presently it is mainly the economic system that conducts human behaviour, especially in the western part of the world. An increased consistency means that human behaviour will be determined by both systems.

EEAs are a reaction to the unsustainable lifestyle of the western part of the world. An EEA is a social experiment within a limited area in where the institutions are purposely changed in order to gather knowledge and experience on how to attain a sustainable society.

The "Christmas Duck" project will involve many people and is also meant as a dynamo for the EEA in Halkaer Aadal and for encouraging people to extend their sustainable behaviour as illustrated in the MOAB-model. The project concerns local sustainability, which is the

intention of the LA21 program. The EEA in Halkaer Aadal is an incentive in the LA21 spirit. The project "Christmas Duck" can be characterized as a simple strategic move towards sustainability.

A question to rise is why do not the households do the composting themselves, as it is a rural area with farmers and large properties? Many of them probably already have animals that eat the organic garbage. Seen from an ecological view the transport of the waste can be polluting and the best is to leave it to the households to do the composting. But by doing so, one looses the social aspect of the project, the people involved do not have to get together to discuss the idea. The project may be more suitable for urban areas where most people live in flats or on small properties without the same ability of storing the compost as inhabitants in a rural area.

The project “Christmas Duck” has the possibility to contribute to an increased consistency between ecology and economy, as it can encourage further expansion of the sustainable behaviour. The increased consistency relies on that all elements in the MOAB-model are present, that being motivation, opportunity, ability and behaviour, which is tried carried out within EEAs. The future will see if they succeed in Halkaer Aadal. From the MOAB perspective it depends though if the economic incentives are good enough to make the inhabitants in Halkaer Aadal change their habits and behaviour concerning garbage management. Research has shown that convenience is an important aspect.

The project "Christmas Duck" might give some policy implications concerning general garbage management as to include organic garbage, paper, bottles and so on. It may also contribute to the development of technologies concerning garbage management. Structures have to be changed as in how to do the refusal service and how to transport the organic waste

from the households to the local farmer. If any employees are discharged in the local garbage service company, they can be transferred to work in the new project or other jobs concerning the environment. In that way they will be a resource that can support sustainability in the Halkaer Aadal area.

The project “Christmas Duck” and the idea of EEA require an understanding of Mother Nature where the humans regard themselves as part of it. The idea of EEAs and the project “Christmas Duck” fit better into an evolutionary economic perspective than into a neo-classic approach. The neo-classic approach does not capture many of the aspects of the "Christmas Duck" project. Evolutionary economics seems to have come one step further than neo-classic economics concerning sustainability and consumption of non-renewable resources.

The simple neo-classic models focus on utility, economic incentives and regard the "Christmas Duck" as an exchange economy. The approach is static and the aim is an equilibrium state. It can be associated with “weak” sustainability as it relies on substitution of productive assets, including natural non-renewable resources. Economic calculations made in the scenario "Christmas Duck”, and the economic incentives given, show that from a static point of view, “other things being equal”, the project is worth while and will contribute to local sustainability in Halkaer Aadal. The neo-classic approach will in accordance to the project raise the question if the right economic incentives are given; and which utility value the actors involved put on the project and what the direct and indirect effects of a project like "Christmas Duck" are; and if the project is worth the effort based on the conditions given when there are imperfect information and so many uncertainties?

The evolutionary economists regard the world as dynamic, opposite from the neo-classic economists. The analysis has shown that this approach is closer to the real world than neo-classic theory and can be associated with “strong” sustainability as it regards resources as complementarities. Important concepts within the evolutionary approach are variation, mutation, selection and trajectories. The approach would probably raise some of the following questions concerning the "Christmas Duck" project; is there enough variations in order to accomplish a selection process; why will the "Christmas Duck" technology survive over another waste management technology; is there a development process, including feedback, going on in the development of the "Christmas Duck" technology in order to change people’s behaviour into a sustainable trajectory?

The project “Christmas Duck”, if set into life, can be a dynamo for further engagement in the ecological problem among people. The two systems, the ecosystem and the economic system, of which humans are part, may come closer to each other in the project. What can be sustainable in the Halkaer Aadal area may not be sustainable elsewhere as every place and situation has its characteristics and has to be adjusted according to the people living there, but there are always some general factors like human behavior.

There might be better alternatives to waste management than the scenario "Christmas Duck", like for instance households being rewarded with something else than a duck or the households may do the composting themselves. Though the project might gather some knowledge and experience about waste management and the implementation of such projects, which can be made use of elsewhere. If implemented, the project will contribute in the direction where human behavior is determined by both economy and ecology. The project

"Christmas Duck" is easily implemented and it can be a vehicle in the process towards a sustainable society in order to maintain life on earth.

When there are so many positive aspects to the project, why is it that a project of this kind has not been carried out earlier? An answer to this can be that development towards sustainability is a complicated process, which requires several changes at the same time. Most people have grown into old habits and routines. These have to be changed, so human behavior will be more sustainable. To obtain sustainability, basic structures like where people live in relation to where they work have to be changed, there should be less commuting to work than today. Political priorities have to be changed, for instance increased support to public transport, increased subsidies to ecological agriculture while decreased subsidies to conventional agriculture, support to ecological experimentation and so on. In large, many changes have to be coordinated on all levels, being local, regional, national and international, so for instance grass root pioneers like in Halkaer Aadal do not give up due to difficulties. Presently local project like the "Christmas Duck" can be in contrast with initiatives on higher levels, or initiatives on higher levels may obstruct local initiatives. Projects coordinated on all levels are the ones to make it. This relates to “bottom-up” and “top-down” management. The "Christmas Duck" project is a typical “bottom-up” incentive. Projects like this have to be supported from both bottom and top to succeed. “Top-down” incentives have little possibility to succeed if local support is not achieved. This is especially relevant in projects where the aim is sustainability.

The project "Christmas Duck" is analysed from a theoretical point of view, which does not explain all aspects of the project. The project is still on the sketch board and the analysis is made on this basis, which can have its disadvantages, as at the moment there is nothing

concrete to study. The project can be studied further from a theoretical point of view using other approaches. Practically or empirically the formal and informal institutions in Halkaer Aadal can be studied in order to examine which ones encourage sustainability and which ones do not. This can also be interesting on a general level. It can also be interesting to analyse the project "Christmas Duck" after it has been set into life, if implemented.

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